

## REMARKS

Applicants' response of October 6, 2004, was persuasive in removing the finality of the rejection. However, due to improper formatting, Applicants' claim amendments were not entered; thus, claims 1-15 remain pending, i.e., claims 5 and 6 were not canceled.

Claim 13 now has been editorially amended. A Petition for a three month extension of time is being filed contemporaneously herewith.

Claims 1-15 stand rejected. The rejections in the Action are respectfully traversed.

A brief summary of the claimed invention may be useful to the Examiner. Applicants disclose and claim that a physical catalyst in a chemical reaction system can be augmented by the exposure of the reaction system to at least one determined frequency. However, the claims recite not just any frequency, but rather, a very specific frequency (or combination of frequencies). The specific frequency (or combination of frequencies) exposed to the reaction system can, for example, correspond to at least one frequency that is characteristic of the catalyst—that is to say, corresponding to the catalyst's emission or absorption spectrum. In other words, catalysis is frequency specific, and that the frequencies desired to augment the functioning of a physical catalyst are those that are related to its emission/absorption spectrum.

### Claim Rejections – 35 U.S.C. §112

Claims 13-15 were rejected under 35 U.S.C. §112, second paragraph as being indefinite. In response, Applicants respectfully submit that the editorial amendment of independent claim 13 should render moot the assertion that there are two separate steps identified as step “(b)”.

### Claim Rejections – 35 U.S.C. §102

Claims 1-4, 7-13 and 15 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,861,484 to Lichtin et al. (hereinafter referred to as “Lichtin”). Applicants respectfully traverse this rejection.

Lichtin discloses a method to degrade organic materials into environmentally compatible products. The method comprises adding a transition metal catalyst, selected from the group of twenty-six (26) catalysts set forth in Table III therein, and a peroxide to a reaction mixture. The reaction mixture contains an organic material in an aqueous medium. The reaction mixture is irradiated with photoenergy, preferably photoenergy in the visible or ultraviolet wavelength

region. The three disclosed photoenergy sources for all twenty-six transition catalysts include a mercury-argon lamp and “sunlight or artificial light from a variety of different [unnamed] sources” (See Column 12, lines 45-51). This is stated as enhancing “organic material degradation” (See Column 12, lines 57-60).

The Action states that “[t]he photoenergy is added to the reaction mixture at wavelengths absorbable by the transition element catalyst which are most effective in enhancing activity of said catalyst (Lichtin patent col. 12, lines 40-45). This disclosure meets the limitations of claims 1, 13 and 15 because the step comprising the determination of the wavelengths most effective in enhancing the activity of the catalyst is equivalent to the instant claim 1, step (a) of determining an electromagnetic spectral pattern of the catalyst...” Applicants respectfully disagree.

Applicants respectfully submit that Lichtin does not appreciate or disclose the importance of first “determining” the claimed “at least one frequency” and thereafter “exposing” the reaction system to the same. After all, Lichtin discloses twenty-six transition element catalysts and three light sources, namely, a mercury-argon lamp; and for commercial production, sunlight or artificial light from a variety of sources, which would put out a much more extensive range of frequencies (See, for example, Col. 12, lines 44-51). There is not even a suggestion, let alone a disclosure, that Lichtin makes any connection between the frequencies that are most effective in enhancing activity and the absorption/emission spectrum of the catalyst. Even more fundamentally, the Lichtin specification provides not a single clue that Lichtin is even aware of which frequency or frequencies are absorbed by his catalyst. Rather, Lichtin is equivalent to the plethora of references that use very broad groups of frequencies in the ultraviolet or visible **ranges** of the spectrum to energize systems (e.g., reactants). The paradigm shifting notion that reactions can be driven (augmented) by catalyst specific frequencies, and that these frequencies bear a relation to the emission/absorption spectra of the catalyst, is absent from Lichtin.

The Action goes on to state that “Lichtin also anticipates steps (b) and (c) of instant claim 1, as well as steps (a) and (b, second instance) of claim 13, because the wavelength that is most effective for enhancing catalyst activity is used, i.e., duplicated, to irradiate the catalyst and the chemical reaction system such that the photoenergy provides increased yields of organic material degradation in comparison to those yields obtained by conventionally known processes (Lichtin patent, Col. 12, lines 55-60).” Applicants respectfully disagree with this statement.

Applicants can appreciate that Lichtin is perhaps “using” a “shotgun” of ultraviolet or visible light frequencies (like much of photochemistry) that are effective in enhancing yields of organic material degradation. Applicants respectfully submit, however, that it is inaccurate to state that Lichtin has “**uplicated**” the enhancing frequency, as Applicants have claimed it, simply because Lichtin has not **determined** that frequency, let alone determined the spectral pattern of his catalyst and made the realization that the peaks of this spectrum, or the harmonics thereof, are, for example, the optimum frequencies to use. This standard “shotgun” approach does not maximize reaction results as in the claimed invention.

In sum, there is no disclosure or suggestion in Lichtin of the importance of the elements of the claimed invention. Specifically, the “matching” of the twenty-six transition element catalysts with the broad spectrum light sources evidences the lack of appreciation of the claimed invention. In other words, There is no disclosure or suggestion that Lichtin knows or has determined the emission spectrum of his catalyst, nor any disclosure or suggestion that the frequencies absorbed by the catalyst correspond or are related to the emission spectrum of the catalyst.

Accordingly, Applicants respectfully request that this rejection be withdrawn.

Claims 1, 3, 4, 7, 8 and 10-15 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,115,280 to Pratt, Jr. (hereinafter referred to as “Pratt”). Applicants respectfully traverse this rejection.

Pratt discloses a method of activating macromolecular species, including enzymes (which are catalysts), comprising subjecting an enzyme-containing reaction mixture to laser radiation at a frequency that excites the vibrational and rotational state of the reactants, and/or of the enzyme.

The Action states that the “wavelength for irradiation is determined by subjecting said macromolecule to laser irradiation and measuring the scattered or transmitted or reflected radiation as a function of frequency amplitude (See Col. 11, lines 60-68). This disclosure meets the limitation of claims 1, 13 and 15 because the step comprising the determination of the wavelength that most selectively enhances the activity of the enzyme is equivalent to the instant claim 1, step (a) of determining an electromagnetic spectral pattern of the enzyme...”

Applicants respectfully disagree. First of all, the determination of the wavelength that most enhances activity is not appreciated by Pratt as being the same thing as determining the

electromagnetic spectral pattern of the catalyst. Moreover, even if Pratt were to recognize that his technique might be determining spectral pattern, he still does not meet the limitation of step (a) of independent claims 1 and 13 because his results would correlate to the spectral pattern of the entire reaction system—catalyst plus reactants plus the carrier medium, e.g., metal substrate, water, air, etc. Thus, it would be impossible for him to tell if a frequency that caused excitation was exciting the catalyst or some other species. For this same reason, Pratt would not know whether his excitation frequency was copying a mechanism of action of a physical catalyst, as recited in claim 13, or was copying a mechanism of action of some other species, such as a reactant. According to the claimed invention, it is important that the frequency excite the catalyst. Thus, Pratt fails to meet the very important step (a) of determining at least one frequency of the electromagnetic pattern of a physical catalyst, or of a harmonic of such a frequency, or of a frequency that copies a mechanism of action of a physical catalyst. Pratt also uses a “shotgun” approach. Accordingly, Applicants respectfully request that this rejection be withdrawn.

Among the significant features of the claimed invention is that, if one knows that a catalyst is present in insufficient quantity, or has been weakened or degraded in performance, the solution to the problem of augmenting its activity is simply to determine its spectral pattern, and then to provide to the reaction system one or more frequencies of electromagnetic radiation corresponding to, or are related to (for example, harmonics of) one or more emission/absorption peaks of the catalyst. No hit-or-miss experimentation should be required. See, for example, page 21, line 30 through page 22, line 6 of the instant specification.

## CONCLUSION

Neither of the applied references seems to appreciate that the photoenergy absorbed by the catalyst is related to the emission/absorption spectrum of the catalyst, let alone the discovery that finding suitable augmenting frequencies is simply a matter of determining that spectrum of the catalyst.

Applicants respectfully request a favorable action on the merits of the Application and a Notice of Allowance directed to claims 1-15.

Should the Examiner deem that any further action on the parts of Applicants would be desirable, the Examiner is invited to contact Applicants' undersigned representative.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'M. G. Mortenson', with a large, sweeping horizontal stroke at the end.

Mark G. Mortenson

Reg. No. 31,182

The Law Offices of Mark G. Mortenson  
Post Office Box 310  
North East, MD 21901-0310  
Telephone: 410-287-8795  
Telefax: 410-287-5046